

# GARR TOOL Milling Guide for Drill Mills

## \* Chamfering \*

TECHNICAL

ISO Material	HRC	M/Min. (Vc) 154M, 154MA 152M, 152MA	CHIPLOAD PER TOOTH (Fz)									
			3.0mm	4.0mm	5.0mm	6.0mm	8.0mm	10.0mm	12.0mm	16.00mm	20.0mm	
<b>COBALT BASE ALLOYS</b>												
Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	24 - 35 20 - 31	.010 - .020 .008 - .015	.010 - .020 .008 - .015	.010 - .020 .008 - .015	.013 - .025 .008 - .020	.020 - .038 .013 - .025	.025 - .046 .020 - .038	.038 - .076 .025 - .038	.051 - .076 .038 - .064	.064 - .089 .038 - .051	
<b>NICKEL BASE ALLOYS</b>												
Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	22 - 35 18 - 31	.010 - .020 .008 - .015	.010 - .020 .008 - .015	.010 - .020 .008 - .015	.013 - .025 .008 - .020	.020 - .038 .013 - .025	.025 - .046 .020 - .038	.038 - .076 .025 - .038	.051 - .076 .038 - .064	.064 - .089 .038 - .051	
<b>IRON BASE ALLOYS</b>												
A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascocolloy	< 40 > 40	22 - 35 20 - 31	.010 - .020 .008 - .015	.010 - .020 .008 - .015	.010 - .020 .008 - .015	.013 - .025 .008 - .020	.020 - .038 .013 - .025	.025 - .046 .020 - .038	.038 - .076 .025 - .038	.051 - .076 .038 - .064	.064 - .089 .038 - .051	
<b>TITANIUM ALLOYS</b>												
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		20 - 31	.008 - .020	.008 - .020	.013 - .030	.013 - .030	.020 - .038	.025 - .038	.033 - .051	.046 - .064	.051 - .076	
5553 / Beta Titanium		35 - 47	.008 - .020	.008 - .020	.010 - .025	.010 - .025	.013 - .030	.020 - .036	.025 - .041	.025 - .051	.038 - .064	
<b>STAINLESS STEELS</b>												
13/8, 15/5, 17-4, pH Types	< 40 > 40	39 - 59 31 - 39	.008 - .015 .005 - .010	.008 - .015 .005 - .010	.008 - .018 .005 - .015	.015 - .023 .008 - .018	.020 - .030 .010 - .020	.033 - .046 .018 - .030	.025 - .051 .020 - .038	.030 - .064 .025 - .041	.030 - .051 .033 - .043	
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	59 - 89 49 - 87	.005 - .015 .008 - .013	.005 - .015 .008 - .013	.013 - .020 .008 - .018	.020 - .038 .013 - .025	.038 - .046 .020 - .030	.025 - .046 .018 - .030	.038 - .064 .033 - .046	.046 - .071 .038 - .058	.056 - .081 .043 - .064	
400 Series - 403, 405, 420, 455	< 40 > 40	59 - 79 39 - 59	.018 - .025 .010 - .020	.018 - .025 .010 - .020	.023 - .038 .015 - .025	.023 - .036 .018 - .028	.028 - .038 .020 - .030	.033 - .046 .023 - .038	.038 - .064 .030 - .051	.051 - .089 .046 - .076	.056 - .102 .051 - .089	
<b>HIGH STRENGTH TOOL STEELS</b>												
A2, D2, P20, H13, S7, O1	< 40 > 40	59 - 79 39 - 59	.008 - .020 .008 - .013	.008 - .020 .008 - .013	.013 - .025 .008 - .020	.025 - .038 .013 - .025	.030 - .051 .013 - .025	.030 - .051 .013 - .025	.036 - .061 .025 - .038	.046 - .066 .030 - .046	.051 - .071 .036 - .051	
<b>MEDIUM ALLOY TOOL STEELS</b>												
4140, 4340, 52100, 6150, 8620	< 40 > 40	59 - 79 39 - 59	.008 - .020 .008 - .013	.008 - .020 .008 - .013	.013 - .025 .008 - .020	.025 - .038 .013 - .025	.030 - .051 .013 - .025	.030 - .051 .013 - .025	.036 - .061 .025 - .038	.046 - .066 .030 - .046	.051 - .071 .036 - .051	
<b>CARBON STEELS</b>												
1000's - 1018, 1020, 12L14	< 40	59 - 79	.008 - .020	.008 - .020	.013 - .025	.025 - .038	.030 - .051	.030 - .051	.036 - .061	.046 - .066	.051 - .071	
<b>CAST MATERIAL</b>												
Ductile Iron		69 - 89	.020 - .031	.023 - .035	.025 - .038	.038 - .064	.038 - .064	.051 - .076	.064 - .089	.089 - .114	.089 - .114	
Gray Iron		69 - 89	.020 - .031	.023 - .035	.025 - .038	.038 - .064	.038 - .064	.051 - .076	.064 - .089	.089 - .114	.089 - .114	
<b>NON-FERROUS</b>												
Aluminum (6061, 7075)		118 - 197	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	
Magnesium		118 - 197	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	
Copper		98 - 177	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	
Brass, Bronze		98 - 157	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	
<b>COMPOSITE (non-ISO)</b>												
Glass Epoxy, Fiberglass, Plastics		79 - 157	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Drilling Guide for Drill Mills

## \* Through Hole \*

TECHNICAL

ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)									
		152DA	3.0mm	4.0mm	5.0mm	6.0mm	8.0mm	10.0mm	12.0mm	16.00mm	20.0mm	
<b>COBALT BASE ALLOYS</b>												
Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	24 - 35	.010 - .020	.010 - .020	.010 - .020	.013 - .025	.020 - .038	.025 - .046	.038 - .076	.051 - .076	.064 - .089	
	> 40	20 - 31	.008 - .015	.008 - .015	.008 - .015	.008 - .020	.013 - .025	.020 - .038	.025 - .038	.038 - .064	.038 - .051	
<b>NICKEL BASE ALLOYS</b>												
Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	22 - 35	.010 - .020	.010 - .020	.010 - .020	.013 - .025	.020 - .038	.025 - .046	.038 - .076	.051 - .076	.064 - .089	
	> 40	18 - 31	.008 - .015	.008 - .015	.008 - .015	.008 - .020	.013 - .025	.020 - .038	.025 - .038	.038 - .064	.038 - .051	
<b>IRON BASE ALLOYS</b>												
A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascocolloy	< 40	22 - 35	.010 - .020	.010 - .020	.010 - .020	.013 - .025	.020 - .038	.025 - .046	.038 - .076	.051 - .076	.064 - .089	
	> 40	20 - 31	.008 - .015	.008 - .015	.008 - .015	.008 - .020	.013 - .025	.020 - .038	.025 - .038	.038 - .064	.038 - .051	
<b>TITANIUM ALLOYS</b>												
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si	< 40	20 - 31	.008 - .020	.008 - .020	.013 - .030	.013 - .030	.020 - .038	.025 - .038	.033 - .051	.046 - .064	.051 - .076	
	> 40	35 - 47	.008 - .020	.008 - .020	.010 - .025	.010 - .025	.013 - .030	.020 - .036	.025 - .041	.025 - .051	.038 - .064	
<b>STAINLESS STEELS</b>												
13/8, 15/5, 17-4, pH Types	< 40	39 - 59	.008 - .015	.008 - .015	.008 - .018	.015 - .023	.020 - .030	.033 - .046	.025 - .051	.030 - .064	.030 - .051	
	> 40	31 - 39	.005 - .010	.005 - .010	.005 - .015	.008 - .018	.010 - .020	.018 - .030	.020 - .038	.025 - .041	.033 - .043	
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	59 - 89	.005 - .015	.005 - .015	.013 - .020	.020 - .038	.038 - .046	.025 - .046	.038 - .064	.046 - .071	.056 - .081	
	> 40	49 - 87	.008 - .013	.008 - .013	.008 - .018	.013 - .025	.020 - .030	.018 - .030	.033 - .046	.038 - .058	.043 - .064	
400 Series - 403, 405, 420, 455	< 40	59 - 79	.018 - .025	.018 - .025	.023 - .038	.023 - .036	.028 - .038	.033 - .046	.038 - .064	.051 - .089	.056 - .102	
	> 40	39 - 59	.010 - .020	.010 - .020	.015 - .025	.018 - .028	.020 - .030	.023 - .038	.030 - .051	.046 - .076	.051 - .089	
<b>HIGH STRENGTH TOOL STEELS</b>												
A2, D2, P20, H13, S7, O1	< 40	59 - 79	.008 - .020	.008 - .020	.013 - .025	.025 - .038	.030 - .051	.030 - .051	.036 - .061	.046 - .066	.051 - .071	
	> 40	39 - 59	.008 - .013	.008 - .013	.008 - .020	.013 - .025	.013 - .025	.013 - .025	.025 - .038	.030 - .046	.036 - .051	
<b>MEDIUM ALLOY TOOL STEELS</b>												
4140, 4340, 52100, 6150, 8620	< 40	59 - 79	.008 - .020	.008 - .020	.013 - .025	.025 - .038	.030 - .051	.030 - .051	.036 - .061	.046 - .066	.051 - .071	
	> 40	39 - 59	.008 - .013	.008 - .013	.008 - .020	.013 - .025	.013 - .025	.013 - .025	.025 - .038	.030 - .046	.036 - .051	
<b>CARBON STEELS</b>												
1000's - 1018, 1020, 12L14	< 40	59 - 79	.008 - .020	.008 - .020	.013 - .025	.025 - .038	.030 - .051	.030 - .051	.036 - .061	.046 - .066	.051 - .071	
<b>CAST MATERIAL</b>												
Ductile Iron		69 - 89	.020 - .031	.023 - .035	.025 - .038	.038 - .064	.038 - .064	.051 - .076	.064 - .089	.089 - .114	.089 - .114	
Gray Iron		69 - 89	.020 - .031	.023 - .035	.025 - .038	.038 - .064	.038 - .064	.051 - .076	.064 - .089	.089 - .114	.089 - .114	
<b>NON-FERROUS</b>												
Aluminum (6061, 7075)		118 - 197	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	
Magnesium		118 - 197	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	
Copper		98 - 177	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	
Brass, Bronze		98 - 157	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	
<b>COMPOSITE (non-ISO)</b>												
Glass Epoxy, Fiberglass, Plastics		79 - 157	.015 - .025	.015 - .025	.020 - .036	.030 - .051	.036 - .071	.051 - .076	.089 - .122	.127 - .152	.147 - .178	

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**